

Westinghouse Electric Corp. in Bloomfield, New Jersey

Special Exposure Cohort Petition SEC-00217

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Advisory Board on Radiation and Worker Health

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Energy Employees Occupational Illness Compensation Program Act
(EEOICPA)



Division of Compensation Analysis and Support

This presentation will discuss

- Petition, site history and background
- Sources of information
- Previous dose reconstructions (DR)
- Potential exposures
- DR feasibility and approaches
- Health endangerment
- Proposed SEC class addition



SEC petition

- Received June 12, 2014
- Petitioned class:

All Atomic Weapons Employer employees who worked at any plant production area of Westinghouse Electric Corp. in Bloomfield, New Jersey, from January 1, 1950 through March 1, 2011

- Qualified for evaluation Jan. 8, 2015 on a lack of monitoring basis



SEC petition

- Petition class evaluated:

All employees who worked in any plant production area of the Westinghouse Electric Corporation site in Bloomfield, NJ during the period from Jan. 1, 1950 through March 1, 2011

- NIOSH determined that April 30, 2000, was the last date for applicable EEOICPA program exposures



Site history and background

- Produced U as an Atomic Weapons Employer (AWE) during WWII
- Covered time periods:
 - 1942 through 1949
 - February-May 1958, June 1959
 - Residual radiation period from 1950-March 1, 2011
- Workers from August 13, 1942–December 31, 1949, added to SEC under petition SEC-00159
- Produced 200 lb of thorium (Th) for the Manhattan Engineer District (MED) in early 1945

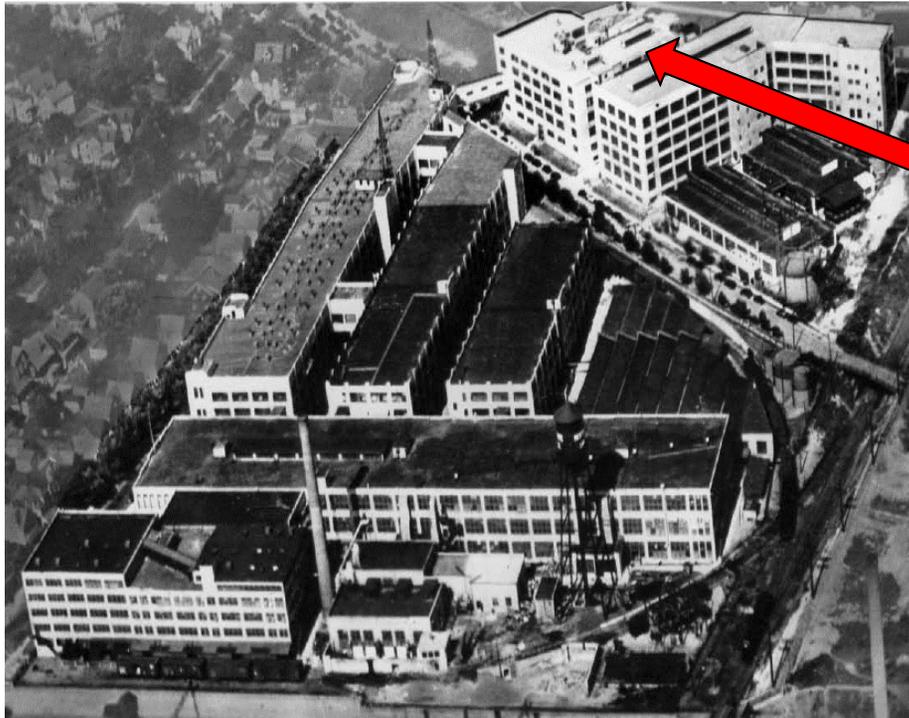


Site history and background

- Processing of U prior to 1950
- Photochemical technique used on Building 7 roof to produce U salt that was pipe-fed to the building's basement
- Then, electrolyzed in the basement to yield U metal
- In 1945, the contract ended (equipment removed, and production facility deactivated)



Site history and background



- 11 main buildings, several smaller buildings, and a garage
- All AWE work took place in the basement and on the roof of Building 7
- After deactivation, Building 7 mostly used for research testing laboratory



Site history and background

- First commercial license issued May 1, 1954
- Received *only* Th compounds
- Commercial rad-work in the 1950s first in Buildings 2, 6, 7, 8, and 9 with 78 workers (26 workers covered 3 shifts)
- Site's commercial work mainly developed and manufactured electric lamps
- Natural Th used to study emission mixtures and production of thoriated tungsten wire



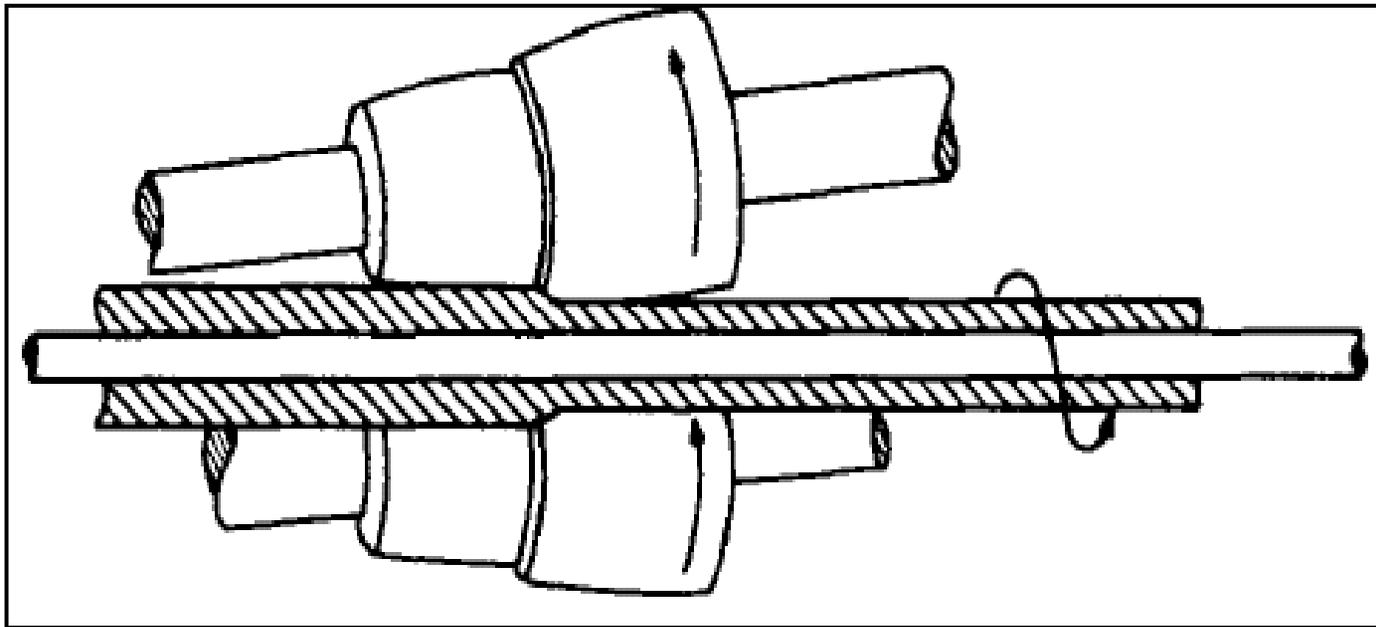
Site history and background

- Based on NIOSH research the Department of Labor (DOL) added 2 more AWE operational periods
 - February-May 1958 and June 1959
 - Active machining for 5 days in 1958 and for 5 days in 1959
- Covered work included feasibility test rollings for Feed Materials Production Center (Fernald, Ohio), and included Department of Energy (DOE) Health and Safety Laboratory (HASL) oversight
- Small lot basis – 6 tubes tested in 1958
- Performed rotary elongation of U tubes for fabrication of fuel elements



Site history and background

Assel Mill Rolls during tube elongation



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Site history and background

- In October 1976, all known or suspected areas involved with the MED work (Building 7) were surveyed under Formerly Utilized Sites Remedial Action Program (FUSRAP)
- Surveys indicated traces of residual U contamination slightly in excess of Nuclear Regulatory Commission (NRC) guidelines in the basement and on an outside loading dock



Site history and background

- Decontamination & Decommissioning (D&D) of Building 7 began in 1976 D&D
- Westinghouse (without DOE involvement) performed all D&D work
- In 1985 all site manufacturing operations stopped
- All D&D completed by April 30, 2000



Sources of available information

- NIOSH used Document *TBD-6000* to model doses from residual contamination generated from machining operations
- 496 documents found in NIOSH Site Research Database (SRDB)
- 8 interviews of former employees and site experts
- Normal data searches also conducted (Internet etc.)



Previous DRs

- 41 WEC claims submitted for dose reconstruction
- 35 cases submitted for energy employees who worked during the period under evaluation (January 1950 – March 1, 2011)
- 32 dose reconstructions completed for energy employees who worked during the period under evaluation
- 0 cases with dosimetry records
- 0 claims with external dosimetry records

(NIOSH DCAS Claims Tracking System Information available as of March 2015)



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Potential exposure

- Internal inhalation and ingestion of U and Th
- External photon / beta exposure from the U source material, its decay products, and small amounts of U and Th surface contamination present after operations ceased



Potential exposure

Internal source(s)

Urinalysis

- NIOSH has reviewed commercial license requirements for WEC to perform urinalysis beginning in 1954; however, NIOSH has not located any record
- Furthermore, WEC requested a license modification for termination of the urinalysis requirement in 1964 due to low exposure potential



Potential exposure

Internal source(s)

Air sample data

- 1958 (2nd operational period) 39 GA, 7 BZ, gross alpha, Max 6595 dpm/m³ Site visit by J. A. Quigley, M.D. (Harris and Kingsley)
- 1959 (3rd operational period) 20 GA, 7 BZ, gross alpha, Max 5551 dpm/m³
- Many other air samples (GA, BZ, ventilation exhaust and surface contamination)
 - However, they were for the monitoring of commercial work and D&D



Potential exposure

External source(s)

No data for AEC work found



Potential exposure

External source(s)

Air monitoring data

- In 1958, J. A. Quigley, M.D. provided oversight and direction of work area decontamination to achieve <0.1 mr/hr
- Other data available for D&D and commercial work



DR feasibility and approaches

- NIOSH finds it is not feasible to estimate commercial exposures with sufficient accuracy for all workers at WEC during the operational periods from Feb. 1, 1958 through May 31, 1958, and from June 1, 1959 through June 30, 1959
- Radiation doses from commercial operations are required to be assessed during the ***AWE Operations Periods***
- NIOSH found that the available monitoring records, process descriptions, and source-term data *are* adequate to complete dose reconstructions with sufficient accuracy for the evaluated class of employees during the ***Residual Radiation Periods***



DR feasibility and approaches

First Residual Radiation Period

- Jan. 1, 1950 through Jan. 31, 1958
- Use the max average pre-work gross-alpha general-area air sample taken during 2nd operational period; 12 dpm/m³
- Assume this sample represents residual alpha contamination generated during the first operational period and re-suspended
- Use the OTIB-70 default depletion constant to model the build-up of this air concentration back to Jan. 1, 1950



DR feasibility and approaches

Second Residual Radiation Period

- June 1, 1958 through May 31, 1959
- Use the average air sample (12 dpm/m³) collected “after all clean-up and decontamination work was done” at the end of the second operational period
- Assume it is representative of the air concentration at the start of this residual radiation period and apply it as a constant



DR feasibility and approaches

Third Residual Radiation Period

- July 1, 1959 through remediation (April 30, 2000)
- Start with the highest air sample (5551 dpm/m³) collected during the third operational period, and use the settling and resuspension method presented in Battelle-TBD-6000 to estimate the airborne concentration at the beginning of this residual radiation period
- Use ORAUT-OTIB-0070 depletion methods for subsequent years



DR feasibility and approaches

D&D Activities

- No remediation period listed for WEC in the DOE-HSS Facilities Database, and no D&D performed at DOE direction or expense
- D&D work on Building 7 began November 1, 1976, completed by April 30, 2000
- Suggest using the third residual radiation period air concentration applicable at the start of each D&D effort to bind exposures, and increase it by order of magnitude to address additional re-suspension created during active D&D (as discussed in document *ORAUT-OTIB-0070*)



DR feasibility and approaches

- The intakes for the residual radiation periods will apply to all personnel with primary responsibilities in the Rad production areas
- For administrative or non-production area personnel, NIOSH will assume that they were exposed to 10% of the air concentration as that for the personnel with primary responsibilities in the Rad production areas



DR feasibility and approaches

- All of the air samples used to create these bounding methods were initially analyzed for gross alpha content; therefore, NIOSH will choose the most claimant-favorable mixture of thorium (from potentially the 1st operational period prior to 1950) or uranium when estimating worker doses
- NIOSH will derive the personal ingestion rate with methodologies presented in OCAS-TIB-009



DR feasibility and approaches

External Doses

- NIOSH will bound residual radiation period doses by using the air concentrations previously modeled for the applicable period, and apply methodology described in ORAUT-OTIB-0070, and the Environmental Protection Agency's Federal Guidance Report No. 12, to model doses from contaminated surfaces and air submersion



DR feasibility and approaches

- NIOSH will use Battelle-TBD-6000, OCAS-TIB-009, and ORAUT-OTIB-0070 methods, as well as available air data and operational descriptions, for ***partial*** dose reconstructions for the following:
- AWE operations associated with the uranium machining project for Fernald from May 12, 1958 through May 16, 1958, and from June 25, 1959 through June 29, 1959



Health endangerment

- The evidence reviewed in this evaluation indicates that some workers in the class may have accumulated chronic radiation exposures through intakes of radionuclides and direct exposure to radioactive materials
- Consequently, NIOSH is specifying the health may have been endangered for those workers who were employed for a number of work days aggregating at least 250 work days within the parameters established for this class or in combination with work days within the parameters established for one or more other classes of employees in the SEC



Residual Periods

(1/1/50 - 1/31/58), (6/1/58 - 5/31/59), (7/1/59 - 4/30/2000)

<u>Exposure Source</u>	<u>Feasible</u>	<u>Not Feasible</u>
Internal	Yes	
External	Yes	

AWE Operations Periods

(2/1/58 - 5/31/58), (6/1/59 - 6/30/59)

Internal	No/Partial
External	No/Partial



Proposed class

All Atomic Weapons Employees who worked at the facility owned by Westinghouse Electric Corp. in Bloomfield, New Jersey, during the period from February 1, 1958 through May 31, 1958, or during the period from June 1, 1959 through June 30, 1959, for a number of work days aggregating at least 250 work days, occurring either solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees included in the Special Exposure Cohort.

